

**ORDERED TWO-PHASE DIELECTRIC FILM, AND  
SEMICONDUCTOR DEVICE CONTAINING THE SAME**

**ABSTRACT OF THE DISCLOSURE**

5 A porous, low-k dielectric film that has good mechanical properties as well as a  
method of fabricating the film and the use of the film as a dielectric layer between  
metal wiring features are provided. The porous, low-k dielectric film includes a first  
phase of monodispersed pores having a diameter of from about 1 to about 10 nm that  
are substantially uniformly spaced apart and are essentially located on sites of a three-  
10 dimensional periodic lattice; and a second phase which is solid surrounding the first  
phase. Specifically, the second phase of the film includes (i) an ordered element that is  
composed of nanoparticles having a diameter of from about 1 to about 10 nm that are  
substantially uniformly spaced apart and are essentially arranged on sites of a three-  
dimensional periodic lattice, and (ii) a disordered element comprised of a dielectric  
15 material having a dielectric constant of about 2.8 or less.